UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CEDAR CREEK AT CEDARTOWN, GEORGIA--FLOODFLOW CHARACTERISTICS FROM WEST GIRARD AVENUE TO THE GEORGIA AVENUE RELOCATION (SUPPLEMENT TO OPEN-FILE REPORTS 75-46 AND 75-332)

By McGlone Price

Open-File Report 82-122

Prepared in cooperation with
Department of Transportation
State of Georgia

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UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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ABSTRACT

In cooperation with the Highway Division, Georgia Department of Transportation, the U.S. Geological Survey determined the backwater effects of existing bridges and dikes on Cedar Creek at Cedartown, Georgia, for the reach from West Girard Avenue to the Georgia Avenue relocation.

The maximum backwater effect for the bridges was 1.7 feet in the upstream approach at the Seaboard Coastline Railroad bridge as a combined result of the Georgia Highway 278 bridge and the Seaboard Coastline Railroad bridge. The maximum effect from the existing dikes was 0.7 foot at the approach section of Georgia Highway 278.

INTRODUCTION

The May 1974 U.S. Geological Survey Open-File Report 75-46, "Cedar Creek at Cedartown, Georgia, Floodflow at Georgia Avenue Relocation and Canal Street Extension" (Price, 1975), prepared in cooperation with the Georgia Department of Transportation, described the hydraulic characteristics of the Georgia Avenue relocation and Canal Street extension as constructed in April 1974, and evaluated the effects of three proposed changes in roadway grade at the Georgia Avenue relocation.

The supplemental U.S. Geological Survey Open-File Report 75-332, "Cedar Creek at Cedartown, Georgia, Floodflow Characteristics from West Girard Avenue to the Georgia Avenue Relocation" (Price, 1975), prepared in cooperation with the Georgia Department of Transportation, described the hydraulic characteristics at the Georgia Avenue relocation with highway grade changes as constructed in June 1975.

In April 1981 the study of floodflow characteristics of Cedar Creek was expanded to include the reach from West Girard Avenue upstream to 1,700 feet above Georgia Avenue.

The purpose of this report is to study present floodflow conditions, as the Cedartown community is planning construction of dikes or retention pools to alleviate flooding problems. The study includes floodflow characteristics for floods having recurrence intervals of 10, 25, 50, and 100 years and the flood of March 4, 1979, for the following conditions:

A. Natural conditions - No bridges or dikes constructed

B. Conditions with existing bridges in place - No dikes constructed

C. Conditions with existing bridges and dikes in place

The Highway Division furnished profiles of the channel and roadways, 29 cross sections of the Cedar Creek channel and flood plain, and aerial photographs of the reach. The locations of the highway crossings and cross sections are shown in figure 1.

The U.S. Army Corps of Engineers furnished data for a gaging station (drainage area, 63.8 mi^2) at old Georgia Avenue bridge (450 ft above the present Georgia Avenue bridge) for the period 1949-58.

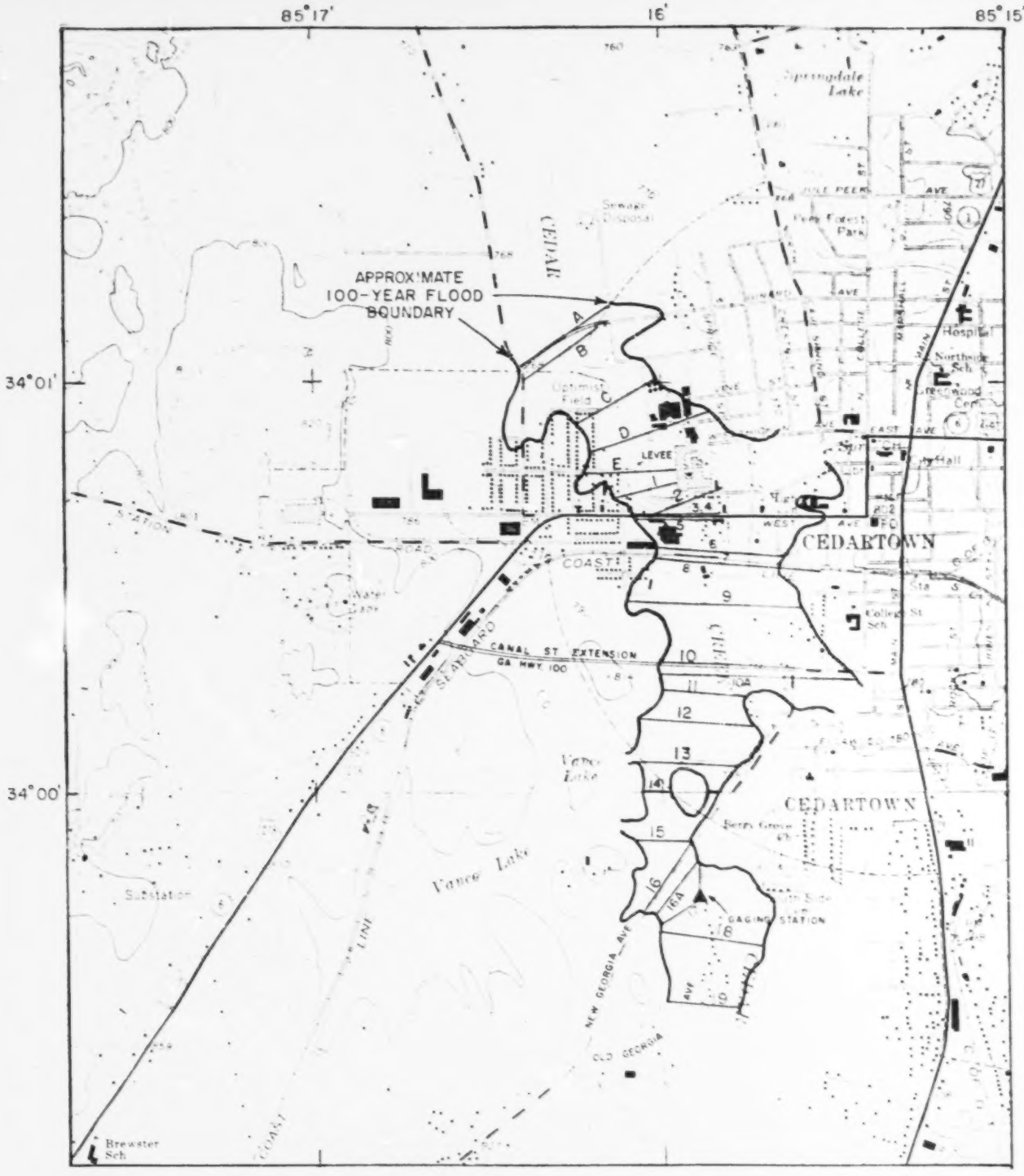

Figure 1.—Location of cross sections, Cedar Creek at Cedartown, Georgia.

The U.S. Geological Survey operated a continuous-record stream gage 6.4 miles downstream from West Girard Avenue, "Cedar Creek near Cedartown, Ga." (station No. 02397500, drainage area, 109 mi^2), for the period 1943-75.

The Federal Insurance Administration, Federal Emergency Management Administration, furnished 50- and 100-year flood profiles of the study reach for existing conditions in their Flood Insurance Study publication for the city of Cedartown, Polk County, Georgia, dated November 1977.

All elevations listed in this report are to National Geodetic Vertical Datum of 1929, which is used by the Highway Division of the Georgia Department of Transportation.

FLOOD FREQUENCY

The flood-frequency relationships of Cedar Creek at Old Georgia Avenue and at the site of the U.S. Geological Survey gage 6.4 miles downstream from West Girard Avenue were computed using techniques described in U.S. Geological Survey Water-Resources Investigations Report 78-137, "Floods in Georgia, Magnitude and Frequency" (Price, 1975), and are shown in figures 2 and 3, respectively. The March 4, 1979, flood was given a historical recurrence interval of 95 years in these computations, as it is known to be the highest flood since 1886, based on information from local residents. The computed frequency curves show that the annual flood peaks at the U.S. Geological Survey gage are not significantly greater than those at Old Georgia Avenue.

The flood-frequency discharges determined for this report are higher than those used in the report of May 1974 due to revisions made to the U.S. Geological Survey gaging-station record based on high-water discharge measurements made during the March 4, 1979, flood.

Logarithmic probability (normal) Station number

Magnitude and frequency of annual floods on Cedar Creek

Old Georgia Avenue Drainage area 63.8 sq mi Period

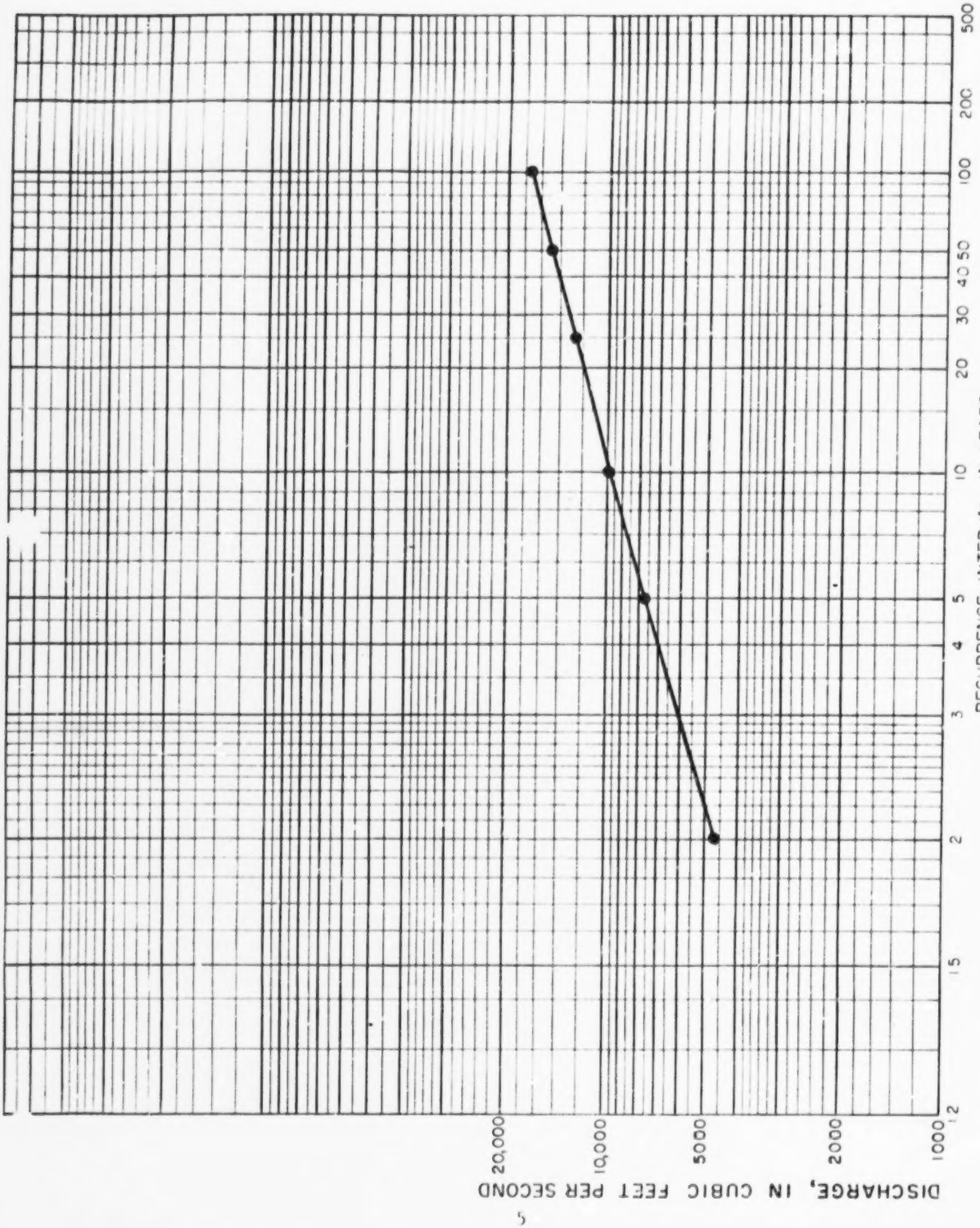

Figure 2.—Flood-frequency curve for Cedar Creek at Old Georgia Avenue at Cedartown, Ga.

Logarithmic probability (normal)

Station number

gnitude and frequency of annual floods on Cedar Creek

at U.S.G.S.—gage near Cedartown, Ga. Drainage area 109 sq mi Period

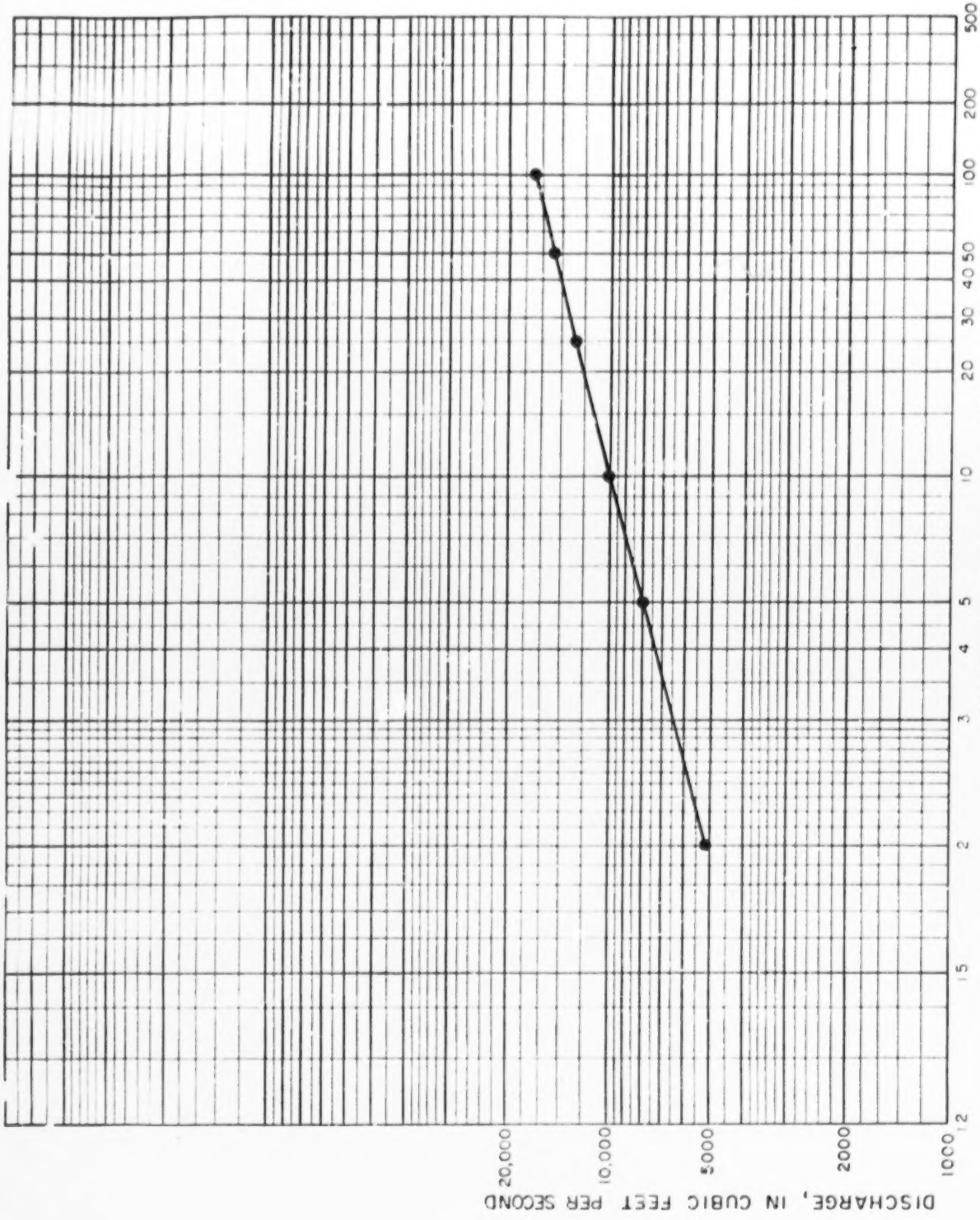

Figure 3.—Flood-frequency curve for Cedar Creek at U.S.G.S. gage near Cedartown, Ga.

FLOOD PROFILES

The flood-profile data for the 10-, 25-, 50-, and 100-year floods for the requested conditions are shown in tables 1-5 and figures 4-8.

The locations of cross sections and roughness values used in flood routing were selected by U.S. Geological Survey personnel during field reconnaissances on April 9-11, 1974, and March 24, 1981. High-water elevations based on floodmarks were determined at each cross section upstream from the Seaboard Coastline Railroad for the flood of April 4, 1974, and at West Girard Avenue, State Highway 278, Canal Street (State Highway 100), Georgia Avenue, and Old Georgia Avenue for the flood of March 4, 1979.

The peak discharge for April 4, 1974, and March 4, 1979, at the U.S. Army Corps of Engineers' gage on Old Georgia Avenue was determined by U.S. Geological Survey personnel by indirect contracted-opening measurements to be 12,700 and 16,500 ft^3/s, respectively.

The flood-profile data were computed using U.S. Geological Survey Computer Program J635. The discharges used for the selected floods routed were those computed for Cedar Creek at Old Georgia Avenue (fig. 2).

The initial step in the flood-routing study was to reproduce the known elevations for the April 4, 1974, and March 4, 1979, floods at the selected cross sections. The field-selected roughness values were adjusted slightly, and the noneffective conveyance at some cross sections was evaluated so that simulated water-surface elevations agreed with those determined from high-water marks. Routing computations were then made for the selected discharges using the adjusted roughness values and cross sections.

Letter symbols were used for the first five cross sections in the profile tables and figures so that cross-section numbers would agree with those used in the report of May 1974.

Table 1.--Flood-profile data for the 10-year flood on Cedar Creek at Cedartown, Ga.

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
A - West Girard Avenue	0	767.5	767.5	767.5	0.0	0.0
B - Approach	200	767.6	767.8	767.8	.2	.2
C	1,200	768.4	768.5	768.5	.1	.1
D	1,800	768.8	768.9	769.0	.1	.2
E	2,400	768.9	769.0	769.1	.1	.2
1	2,880	769.1	769.1	769.3	.0	.2
2	3,280	769.4	769.4	769.7	.0	.3
3 - State Highway 278 (West Avenue)	3,400	769.6	769.6	770.0	.0	.4
5 - Approach	3,550	769.8	770.2	770.3	.4	.5
6 - Seaboard Coastline Railroad	3,980	770.0	770.4	770.5	.4	.5
8 - Approach section	4,130	770.4	771.0	771.1	.6	.7
9	4,680	771.2	771.5	771.6	.3	.4
10 - State Highway 100 (Canal Street)	5,580	772.2	772.3	772.3	.1	.1
10A - Approach	5,730	772.4	773.0	773.0	.6	.6
11	5,930	772.6	773.2	773.2	.6	.6
12	6,430	773.2	773.7	773.7	.5	.5
13	7,030	774.1	774.5	774.5	.4	.4
14	7,430	774.8	775.1	775.1	.3	.3
15	8,080	776.2	776.3	776.3	.1	.1

Table 1.—Flood-profile data for the 10-year flood on Cedar Creek at Cedartown, Ga.—Continued

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
16 - Georgia Avenue	8,530	776.7	776.7	776.7	0.0	0.0
16A - Approach	8,680	777.0	777.6	777.6	.6	.6
17A - Old Georgia Avenue	8,980	777.2	777.8	777.8	.6	.6
18	9,680	777.6	778.1	778.1	.5	.5
19	10,680	778.2	778.6	778.6	.4	.4

10-Year discharge used in routing = 9,630 ft^3/s
Condition A - no bridges or dikes.
Condition B - bridges only included.
Condition C - bridges and dikes included.

Table 2.--Flood-profile data for the 25-year flood on Cedar Creek at Cedartown, Ga.

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
A - West Girard Avenue	0	768.7	768.7	768.7	0.0	0.0
B - Approach	200	768.8	769.4	769.4	.6	.6
C	1,200	769.6	770.0	770.0	.4	.4
D	1,800	770.0	770.4	770.4	.4	.4
E	2,400	770.2	770.5	770.6	.3	.4
1	2,880	770.3	770.6	770.7	.3	.4
2	3,280	770.7	770.8	771.1	.1	.4
3 - State Highway 278 (West Avenue)	3,400	771.0	771.1	771.5	.1	.5
5 - Approach	3,550	771.2	771.8	772.0	.6	.8
6 - Seaboard Coastline Railroad	3,980	771.7	772.3	772.6	.6	.9
8 - Approach section	4,130	772.0	773.0	773.2	1.0	1.2
9	4,680	772.8	773.5	773.7	.7	.9
10 - State Highway 100 (Canal Street)	5,580	774.0	774.4	774.6	.4	.6
10A - Approach	5,730	774.2	775.0	775.0	.8	.8
11	5,930	774.3	775.1	775.1	.8	.8
12	6,430	774.6	775.4	775.4	.8	.8
13	7,030	775.4	775.9	775.9	.5	.5
14	7,430	776.4	776.7	776.7	.3	.3
15	8,080	777.8	777.9	777.9	.1	.1

Table 2.—Flood-profile data for the 25-year flood on Cedar Creek at Cedartown, Ga.—Continued

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
16 - Georgia Avenue	8,530	778.4	778.4	778.4	0.0	0.0
16A - Approach	8,680	778.6	779.3	779.3	.7	.7
17A - Old Georgia Avenue	8,980	778.8	779.4	779.4	.6	.6
18	9,680	779.1	779.6	779.6	.5	.5
19	10,680	779.5	779.8	779.8	.3	.3

25-Year discharge used in routing = 12,700 ft^3/s
Condition A - no bridges or dikes.
Condition B - bridges only included.
Condition C - bridges and dikes included.

Table 3.—Flood-profile data for the 50-year flood on Cedar Creek at Cedartown, Ga.

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
A - West Girard Avenue	0	770.0	770.0	770.0	0.0	0.0
B - Approach	200	770.1	770.8	770.8	.7	.7
C	1,200	770.7	771.3	771.3	.6	.6
D	1,800	771.2	771.6	771.7	.4	.5
E	2,400	771.3	771.7	771.9	.4	.6
1	2,880	771.5	771.8	772.0	.3	.5
2	3,280	771.7	771.9	772.3	.2	.6
3 - State Highway 278 (West Avenue)	3,400	772.0	772.1	772.7	.1	.7
5 - Approach	3,550	772.3	773.3	773.6	1.0	1.3
6 - Seaboard Coastline Railroad	3,980	772.7	773.5	773.7	.8	1.0
8 - Approach section	4,130	773.3	774.5	774.6	1.2	1.3
9	4,680	774.1	775.1	775.2	1.0	1.1
10 - State Highway 100 (Canal Street)	5,580	775.2	775.8	775.9	.6	.7
10A - Approach	5,730	775.5	776.3	776.3	.8	.8
11	5,930	775.7	776.5	776.5	.8	.8
12	6,430	775.9	776.7	776.7	.8	.8
13	7,030	776.5	777.1	777.1	.6	.6
14	7,430	777.5	777.8	777.8	.3	.3
15	8,080	778.8	778.9	778.9	.1	.1

Table 3.—Flood-profile data for the 50-year flood on Cedar Creek at Cedartown, Ga.—Continued

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
16 - Georgia Avenue	8,530	779.2	779.2	779.2	0.0	0.0
16A - Approach	8,680	779.4	780.3	780.3	.9	.9
17A - Old Georgia Avenue	8,980	779.8	780.5	780.5	.7	.7
18	9,680	780.1	780.7	780.7	.6	.6
19	10,680	780.4	780.8	780.8	.4	.4

50-Year discharge used in routing = 14,900 ft^3/s
Condition A - no bridges or dikes.
Condition B - bridges only included.
Condition C - bridges and dikes included.

Table 4.--Flood-profile data for the March 4, 1979, flood on Cedar Creek at Cedartown, Ga.

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
A - West Girard Avenue	0	770.8	770.8	770.8	0.0	0.0
B - Approach	200	770.9	771.8	771.8	.9	.9
C	1,200	771.5	772.2	772.2	.7	.7
D	1,800	771.9	772.4	772.6	.5	.7
E	2,400	772.0	772.5	772.8	.5	.8
1	2,880	772.1	772.6	772.9	.5	.8
2	3,280	772.4	772.8	773.1	.4	.7
3 - State Highway 278 (West Avenue)	3,400	772.8	772.9	773.5	.1	.7
5 - Approach	3,550	773.0	774.1	774.4	1.1	1.4
6 - Seaboard Coastline Railroad	3,980	773.4	774.3	774.6	.9	1.2
8 - Approach section	4,130	774.4	776.0	776.1	1.6	1.7
9	4,680	775.2	776.4	776.5	1.2	1.3
10 - State Highway 100 (Canal Street)	5,580	776.2	777.1	777.1	.9	.9
10A - Approach	5,730	776.5	777.4	777.4	.9	.9
11	5,930	776.7	777.5	777.5	.8	.8
12	6,430	776.9	777.7	777.7	.8	.8
13	7,030	777.5	778.1	778.1	.6	.6
14	7,430	778.4	778.7	778.7	.3	.3
15	8,080	779.4	779.6	779.6	.2	.2

Table 4.--Flood-profile data for the March 4, 1979, flood on Cedar Creek at Cedartown, Ga.--Continued

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
16 - Georgia Avenue	8,530	780.0	780.0	780.0	0.0	0.0
16A - Approach	8,680	780.1	781.0	781.0	.9	.9
17A - Old Georgia Avenue	8,980	780.4	781.1	781.1	.7	.7
18	9,680	780.6	781.2	781.2	.6	.6
19	10,680	780.9	781.4	781.4	.5	.5

March 4, 1979, discharge used in routing = 16,500 ft^3/s
Condition A - no bridges or dikes.
Condition B - bridges only included.
Condition C - bridges and dikes included.

Table 5.--Flood-profile data for the 100-year flood on Cedar Creek at Cedartown, Ga.

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
A - West Girard Avenue	0	771.2	771.2	771.2	0.0	0.0
B - Approach	200	771.3	772.2	772.2	.9	.9
C	1,200	771.9	772.6	772.6	.7	.7
D	1,800	772.3	772.8	773.1	.5	.8
E	2,400	772.4	772.9	773.2	.5	.8
1	2,880	772.5	773.0	773.3	.5	.8
2	3,280	772.9	773.2	773.5	.3	.6
3 - State Highway 278 (West Avenue)	3,400	773.2	773.3	774.0	.1	.8
5 - Approach	3,550	773.3	774.5	774.6	1.2	1.3
6 - Seaboard Coastline Railroad	3,980	773.7	774.6	774.9	.9	1.2
8 - Approach section	4,130	774.6	776.3	776.4	1.7	1.8
9	4,680	775.5	776.7	776.8	1.2	1.3
10 - State Highway 100 (Canal Street)	5,580	776.5	777.4	777.4	.9	.9
10A - Approach	5,730	776.8	777.8	777.8	1.0	1.0
11	5,930	776.9	777.9	777.9	1.0	1.0
12	6,430	777.2	778.0	778.0	.8	.8
13	7,030	777.8	778.4	778.4	.6	.6
14	7,430	778.6	778.9	778.9	.3	.3
15	8,080	779.6	779.8	779.8	.2	.2

Table 5.--Flood-profile data for the 100-year flood on Cedar Creek at Cedartown, Ga.—Continued

Cross section (See fig. 1)	Distance (ft)	WATER SURFACE ELEVATION, FEET (NGVD) Condition A	Condition B	Condition C	Backwater (ft) (B - A)	Backwater (ft) (C - A)
16 - Georgia Avenue	8,530	780.1	780.2	780.3	0.1	0.1
16A - Approach	8,680	780.3	781.3	781.3	1.0	1.0
17A - Old Georgia Avenue	8,980	780.7	781.5	781.5	.8	.8
18	9,680	780.9	781.6	781.6	.7	.7
19	10,680	781.2	781.7	781.7	.5	.5

100-Year discharge used in routing = 17,100 ft^3/s
Condition A - no bridges or dikes.
Condition B - bridges only included.
Condition C - bridges and dikes included.

BACKWATER EFFECTS

The backwater effect at each cross section is shown in tables 1-5. Backwater was computed for two conditions: (1) bridges only (B-A) and (2) bridges and dikes (C-A). The maximum backwater for bridges only for the 100-year flood at each bridge is listed below.

West Girard Avenue	0.9 ft
State Highway 278 (West Avenue)	1.2 ft
Seaboard Coastline Railroad (combined effect of State Highway 278 and Seaboard Coastline Railroad	1.7 ft
State Highway 100 (Canal Street--0.9 ft from Seaboard Coastline Railroad and 0.1 ft from State Highway 100)	1.0 ft
Georgia Avenue	1.0 ft

The existing dikes on the right bank are from cross sections C to 3 and on the left bank from cross sections 3 to 6. The maximum backwater effect for the existing dikes for the 100-year flood (the difference between conditions B and C) was 0.7 ft at the approach section of State Highway 278. The dikes are overtopped downstream from cross section 1 for discharges greater than approximately 14,000 ft^3/s.

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Federal Emergency Management Agency, 1977, Flood Insurance Study, city of Cedartown, Polk County, Georgia: Federal Insurance Administration, 20 p., 4 pls.

Price, McGlone, 1975, Cedar Creek at Cedartown, Georgia, floodflow characteristics at Georgia Avenue relocation and Canal Street extension: U.S. Geological Survey Open-File Report 75-46, 15 p.

_____1975, Cedar Creek at Cedartown, Georgia, Floodflow characteristics at bridge site at Georgia Avenue relocation: U.S. Geological Survey Open-File Report 75-332, 6 p.

_____1979, Floods in Georgia, magnitude and frequency: U.S. Geological Survey Open-File Report 78-137, 169 p.

9-213-F
(March 1949)
Cross Section—Double

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GEOLOGICAL SURVEY
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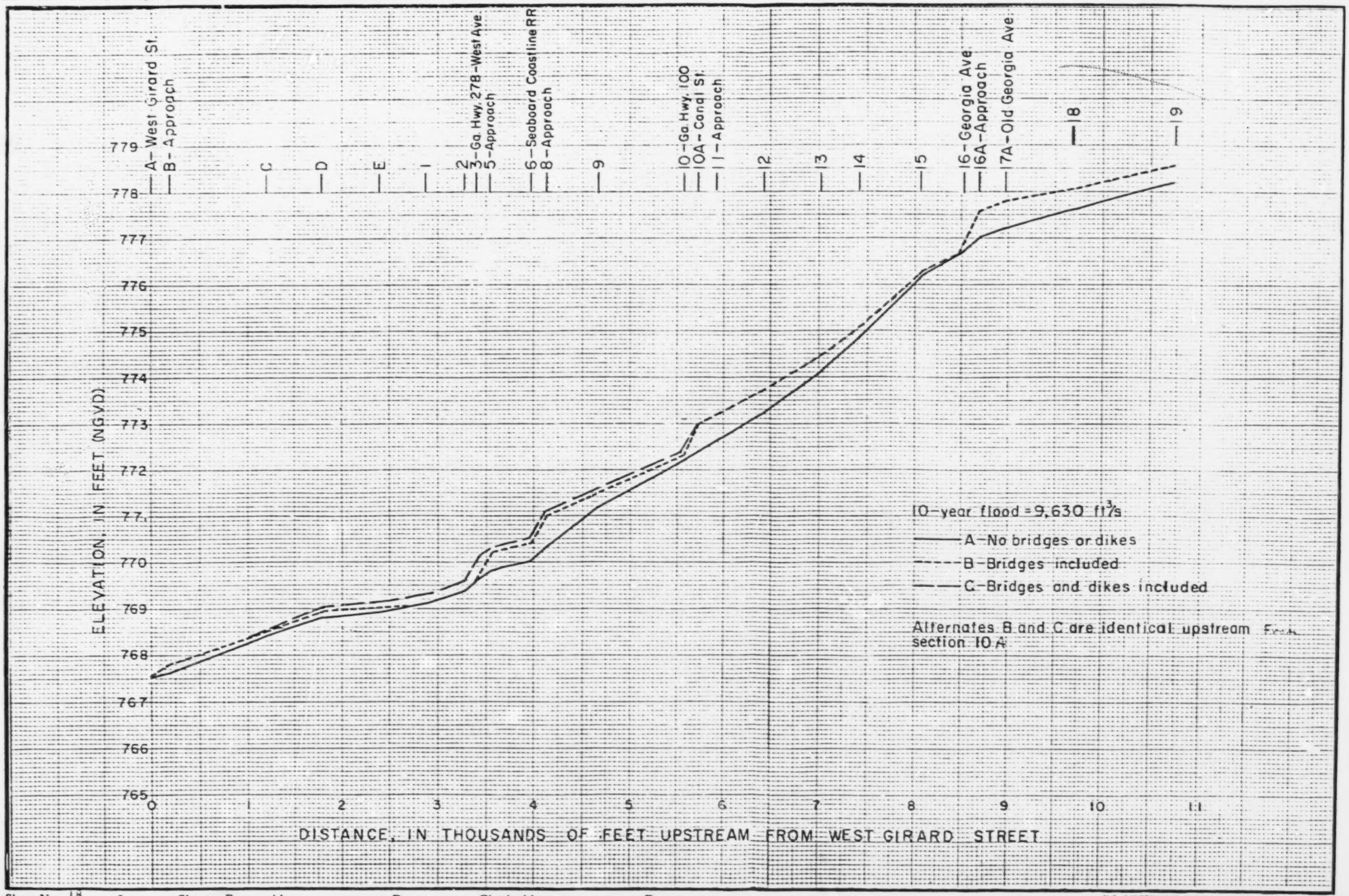
Figure 4.—Flood-profile for 10-year flood on Cedar Creek at Cedartown, Ga.



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Cross-Section—Double

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Figure 5.—Flood-profile for 25-year flood on Cedar Creek at Cedartown, Ga.

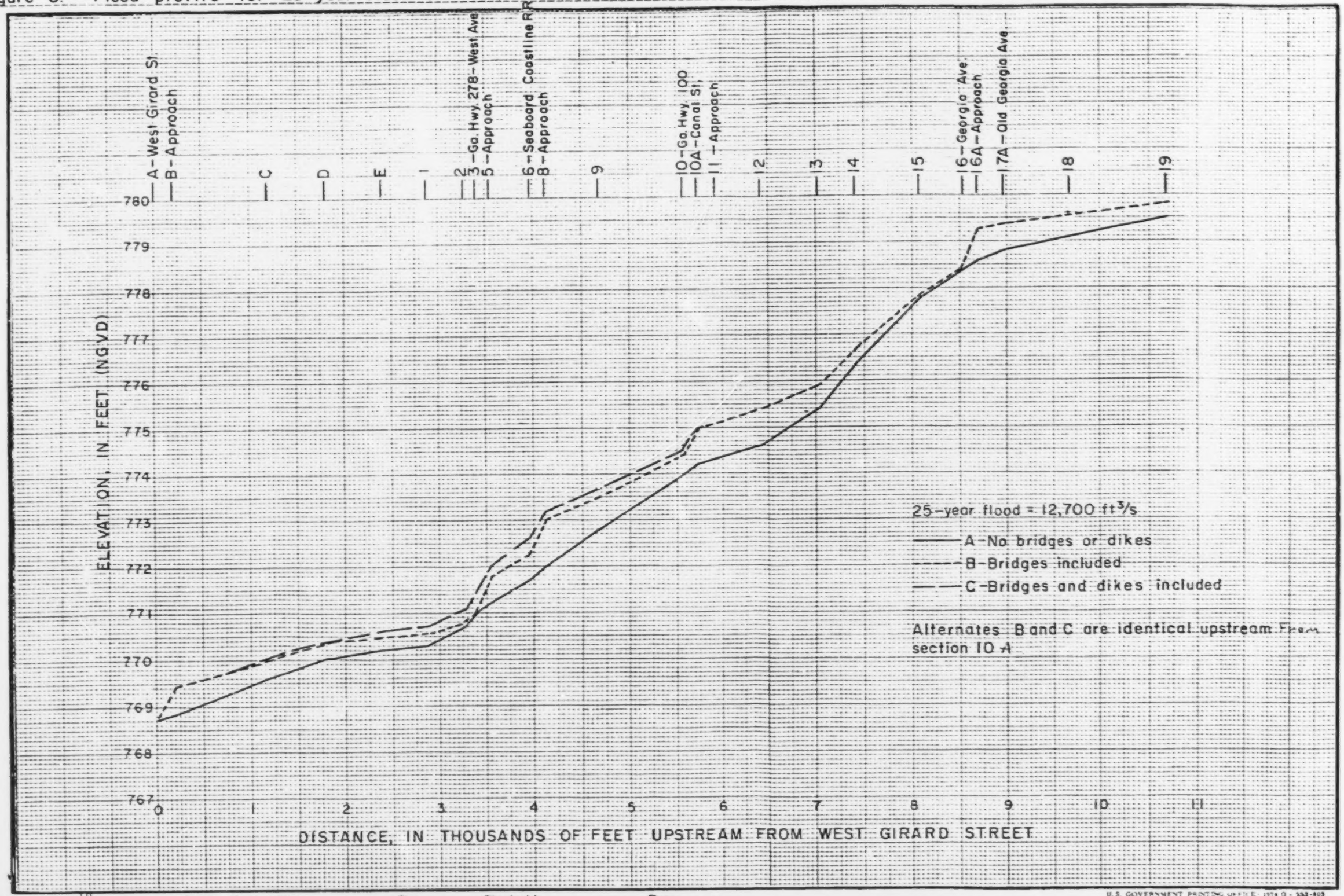

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Figure 6.—Flood profile for 50-year flood on Cedar Creek at Cedartown, Ga.

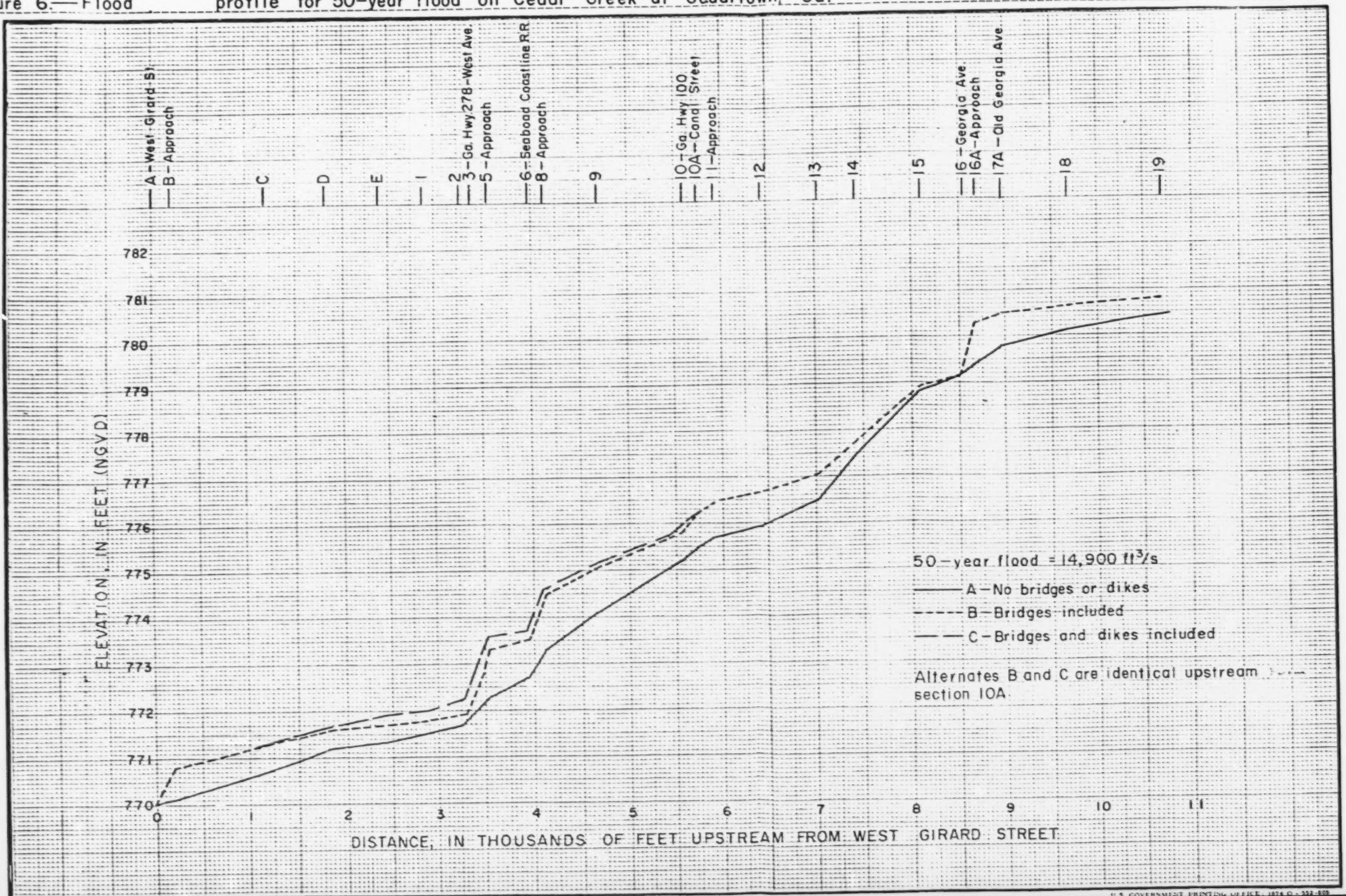

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Figure 7.—Flood-profile for March 4, 1979 flood on Cedar Creek at Cedartown, Ga.

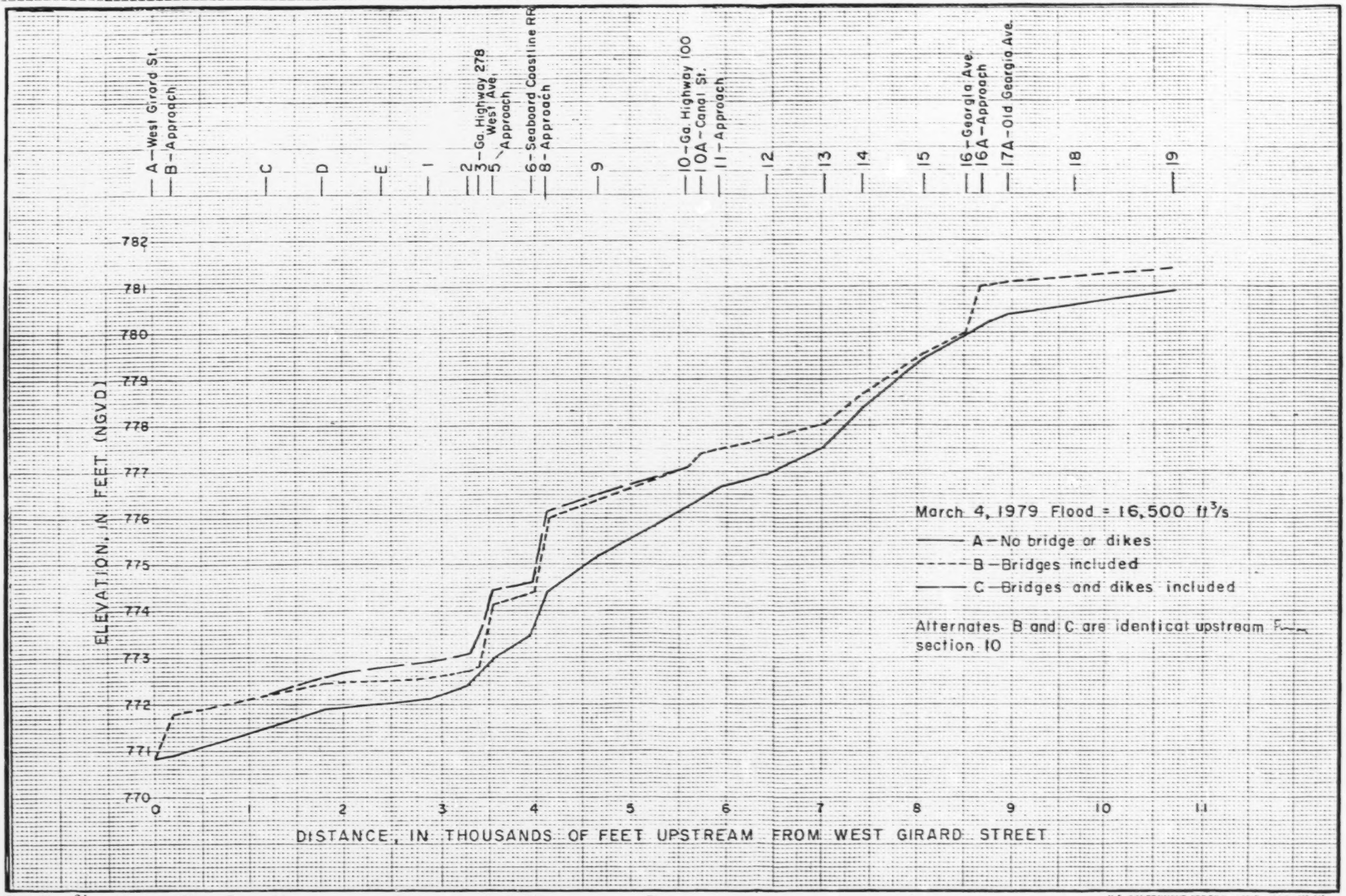

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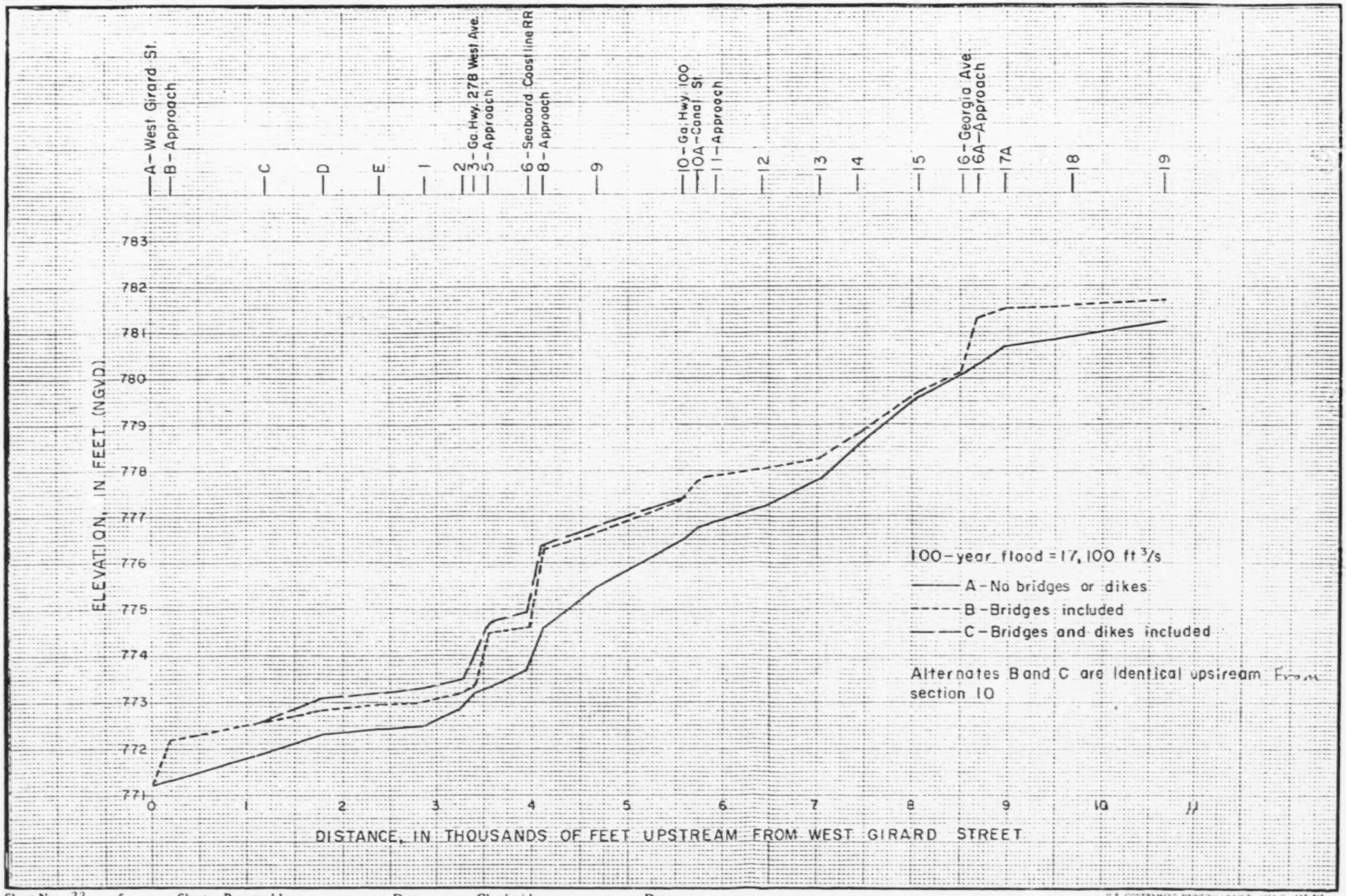
Figure 8.—Flood-profile for 100-year flood on Cedar Creek at Cedartown, Ga.



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